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樹 木 成 分 集 (I)

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Koichiro KITAO* and Akira SATO*: Accessory Wood Constituents (I)

樹木の抽出成分はそれ自体の薬品，工業原料としての利用のほか，一般にこれらの木材に含まれる量はたとえ僅少でも，木材の色沢，感触，耐朽，耐虫害，塗装，接着，パルプおよび製紙等木材利用面に大きい影響を有するものであり，さらに樹木の識別，育種，分類学に関して有する意義はきわめて大きい。近年合板等木質材料，パルプ紙等木材工業に用いられる樹種は，従来使用されることの少なかつたわが国の種々雑多な広葉樹から熱帯，北洋各地の海外樹種に至るまで次第に広範囲となり，今後この傾向はますます著しくなると考えられる。10年以前木材研究所の所員の間で“木材辞典”を刊行した。冊子の大きさのためもあり集録した木材関係の天然有機物の数は制限されたものであつた。しかしたとえ集録の範囲を当時もつと広げたとしてもその後の10年における世界の木材抽出物の研究の増加はきわめて著しくもはや現在では不充分であろう。よつて最近までの既知木材成分の一覧表ともいうべきものを作つて，主として木材利用に関する参考のために，あわせて基礎的研究にも役立たせたいと考えた。すでに植物成分全域にわたる著書としては，W. KARRER の Konstitution u. Vorkommen d. org. Pflanzenstoffe (1958, 1962)，林業試験場編 木材工業ハンドブック（特殊林産の部）(昭36) があり，さらに近年刈米博士等によつて刊行されつつある Annual Index of the Reports on Plant Chemistry の価値は誠に大きいのであるが，われわれは広範囲の植物成分全域から，木材に関連が遠いと思われる草本，灌木，葉，花，果実等に関するものをできるだけ省き，木材成分のみを，しかも樹種名の A, B, C 順に排列したならばいささか便利であろうと考え，ここにその（I）を本記念号に載せることとした。しかし準備期間の短かかつたためもあり，はなはだ不完全であるのを恐れている。次回に誤を正し，不足を補ない初期の目的に近づけたいと考えている。

Abies firma SIEB. et ZUCC. モミ．〔分析 (%)〕全繊維素 51.60, α-繊維素 38.19, リグニン 30.89, 抽出物 1.51 (2.29)〔葉蠟〕neutral estolide, A.I. (1959).

Abies mariesii MAST. オオシラビソ（アオモリトドマツ）．〔分析 (%)〕全繊維素 47.79, α-繊維素 29.67, リグニン 30.14, 抽出物 3.22 (1.57)〔葉〕benzoic acid, maltol, A.I. (1959).

Abies sibirica (樹脂) longifolene, caryophyllene, ε-cadinene, humulene, γ-selinene, bisabolene, CHIRKOVA et al., ABIPC **33**, 401 (1962).

Abies Veitchii LINDL. シラビソ．〔分析 (%)〕全繊維素 51.70, α-繊維素 36.21, リグニン 29.48, 抽出物 2.53 (1.79)〔葉〕maltol, A.I. (1959).

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Acacia intertexta (心材) tetracacidin, isotetracacidin, (+)-pinitol, CLARK-LEWIS et al., J. Chem. Soc., **1961**, 499.

A. arabica (心材) quercetin, catechin, gallic acid, BHANU et al., ABIPC, **33**, 698 (1963).

A. excelsa (心材) melacacidin, isomelacacidin, pipecolic acid, 4-hydroxypipecolic acid, dihydro-(7, 8, 3′, 4′)-tetrahydroxyflavonol, trans-4-hydroxypipecolic acid, A.I. (1960).

A. harpophylla, melanoxylon (心材) melacacidin, isomelacacidin, 7, 8, 3′, 4′-tetrahydroxyflavonol, okanin, KING et al., J. Chem. Soc., **1954**, 1399, A.I. (1960).

A. catechu (心材) l-catechin, dl-catechin, l-epicatechin (K. 1958).

A. mollissima (樹皮) leucorobinetidin, leucofisetinidin A.I. (1958), (−)-7, 3′, 4′, 5′-tetrahydroxyflavan-3-ol (=(−)-robinetindiol), (+)-catechin, (+)-gallocatechin, A.I. (1958, 1960); (心材) mollisacacidin (=gleditsin), (+)-fustin, fisetin, tannin, (−)-, (+)-leucofisetinidin, A.I. (1959, 1960), ROUX et al., Biochem. J., **82**, 320 (1962); **77**, 315 (1960).

A. mollissima, decurrens, dealbata, picnantha: ROUX et al., Biochem. J., **78**, 834 (1961).

Acacia pycnantha (ゴム質), A.I. (1959).

Acacia 属 (花, 葉), K. (1958).

Acer ginnala カラコギカエデ (葉) Acertannin (=3, 6-di-o-galloyl-1, 5-anhydro-D-glucitol), A.I. (1960).

Acer negundo ネグンドカエデ (材) β-sitosterol, β-sitosteryl glycoside, a triterpene acid. 近藤民雄, 伊藤博之, 須田元茂, 木材誌, **3**, 151 (1957).

Acer saccharum (辺材) glucomannan (心材) 4-o-methylglucuronoxylan (樹皮) arabinogalactan, G. A. ADAMS, Svensk Papperstidn. **67**, 82 (1964).

Aesculus spp. トチノキ属 (樹皮) fraxetin, fraxinol, fraxin, esculetin, 島田, C. (1937), II. 2849; I. 1580; C. A. (1952), 46, 6328, C. (1941), II. 1867.

Adina cordifolia (心材) adifoline (a new alkaloid), benzoic acid, umbelliferone, β-sitosterol, CROSS et al., J. Chem. Soc., **1961**, 2714.

Alnus glutinosa (樹皮) protoalnulin (=taraxerone, skimmione), lupeol, alnusone (=glutinone), taraxerol, tannin, quercetin galactoside (=hyperin)

A. incana (樹皮) taraxerol.

A. viridis (樹皮) protoalnulin, K. (1958), A.I. (1959).

A. japonica ハンノキ (木材分析) alc. benz. ex. 1.89, pent. 25.7, lignin 23.6, α-cell. 40.9%

A. rubra (樹皮, 材) E. F. KURTH, E. L. BECKER, TAPPI, **36**, 461 (1953).

Angophora subvelutina (材) ellagic acid, sitosterol, 24-methylenecycloartanol, 24-hydroxytetracosanoic acid, tetracosanoic acid, RITCHIE et al., Austral. J. Chem., **14**, 473 (1961).

Araucaria cunninghamii（精油）n-nonane, n-undecane, (−)-, (±)-α-pinene, (−)-β-pinene, myrcene, (±)-limonene, terpinolene, caryophyllene, humulene, GALLAGHER et al., Austral. J. Chem., **13**, 367 (1960).

Artocarpus integrifolia（心材）artocarpin, その構造, DAVE et al., ABIPC, **31**, 1779 (1961).

Balanops australiana（樹皮）friederin, friederin-3β-ol, friederin-3α-ol, cerin, betulinic acid, HOWDEN et al., J. Chem. Soc., **1962**, 498.

Betula alba, *B. lenta*（葉，芽）α-betulenol, β-betulenol, A.I. (1959, 1960).

B. verrucosa (?) betula-folientriol, betula-folientetraol, A.I. (1959).

Betula tauschii（材）betulinic acid methylester, squalene 北尾弘一郎, ABIPC, **33**, 1576 (abs. no. 8577).

Betula papyrifera（材）fatty acid glycerides, sterol esters, squalene, M. A. BUCHANAN, S. L. BURSON JR., C. H. SPRINGER, TAPPI, **44**, 576 (1961).

Betula papyrifera（内皮）pectin, T. E. TIMELL, A. Jabbar MIAN, TAPPI, **44**, 788 (1961).

Cedrus deodara ヒマラヤスギ, *C. atlantica*, *C. libani*（材，精油）α-, β-himachalene (bicyclic sesquiterpene hydrocarbon) ERDTMAN et al., Acta Chem. Scand., **15**, 685 (1961).

Chamaecyparis obtusa ENDL., ヒノキ〔分析〕h.c. 54.72, c. 41.00, lignin 29.90, ex. 2.03 (2.91)〔材〕cadinene, thujopsene, hinokiol, α-pinene〔樹皮〕sugiol, xanthoperol, lignoceryl alcohol, phytosterol, lignoceric acid, 幡，十河，亀丸，木材誌 **8**, 167 (1962),〔根〕α-pinene, camphene, limonene, dipentene, terpenealcohol, camphor, cadinene, cadinol〔葉〕hinokiflavone, d-catechin, quercecitrin, afzelin, myricitrin, taxifolin と aromadendrin の配糖体；α-pinene, limonene, camphene, bornyl acetate, terpenyl acetate, sesquiterpene, sesquiterpenealcohol, diterpene, hinokiic acid, bornylnonylate,〔葉蠟〕sabinic acid, lauric acid, dodecane-1, 12-dioic acid (m.p. 126.8–127.8), juniperic acid, palmitic acid, thapsic acid, triacontanoic acid, dodecane-1, 12-diol, nonacosane, nonacosan-10-ol, nonacosan-10-one (m.p. 74.0–75.0°), pentatriacontane, triacontan-1-ol; pentadecane, hexadecane, heptadecane, octadecane, nonadecane, eicosane, 福井，有吉，薬誌，**83**, 1106 (1963), A.I. (1958, 1959), 木工ハンド，879.

Chamaecyparis pisifera ENDL., サワラ〔分析〕h.c. 53.86, c. 33.76, lignin 31.32〔材〕cadinene, α-, δ- および x-cadinol; L-arabinose, sawaranin (=2,3-desoxy-2-(p-hydroxy phenyl) hexonic lactol) 今村，林業試，No. 138, 1 (1962),〔葉〕hinokiflavone, d-pinitol, α-pinene, dipentene, borneol, bornyl acetate, bornyl formate, sesquiterpene alcohol, 3環性 diterpene, undecylic acid,〔葉蠟〕neutral estolide A.I. 1958, 1959, 1960, 木工ハンド，879.

Chlorophora tinctoria（心材）maclurin, dihydromorin, dihydrokaempferol, morin A.I. (1959).

Clerodendron trichotomum クサギ（樹皮）picein, friederin, epifriedenol, 野々村,

C.A. (1956), 50, 893.

Cordia trichotoma (材) α-, β-, γ-eudesmol, guajol, M. K. SEIKEL, J. W. ROWE, Phytochem., 3(1), 27 (1964).

Cornus controversa ミズキ (葉) isoquercitrin A.I. (1958).

Cryptomeria japonica D. DON, スギ 〔分析〕 h.c. 53.47, cell. 39.57, lignin 33.14, ex. 2.00 (2.25) 〔材〕 cadinene, cryptomeriol, cryptomeric acid ($C_{20}H_{30}O_2$) 慶松, 石黒, 薬誌, **57**, 69 (1937) sugiol, xanthoperol, ferruginol, phyllocladanol, iso-dextropimaric acid, β-sitosterol, S. NAGAHAMA, Bull. Chem. Soc. Jap., **36**, 753 (1963), cryptomeridiol (=selinan-4α, 11-diol) 住本, 伊東, 平位, 和田, 木材誌, **10**, 81 (1964), S_1 (=$C_{17}H_{18}O_4$, m.p. 230–231°), S_2 (=$C_{17}H_{18}O_5$, m.p. 212–212.5) 船岡, 黒田, 甲斐, 近藤, 木材誌, **9**, 139, 142 (1963), 〔樹皮〕 xanthoperol 0.49%, behenic acid 0.11% 〔根〕 sugiol, xanthopherol, ferruginol, dehydroferruginol, phyllocladanol ($C_{20}H_{34}O$, m.p. 182–183°), isophyllocladene ($C_{20}H_{32}$ m.p. 108°), cadinene, cryptomeradol, machilol 〔葉〕 hinokiflavone, kayaflavone, sciadopitysin, kaurene (=α-podocarprene 〔葉蠟〕 neutral estolide A.I. (1959, 1960).

Cryptomeria japonica var. *araucarioides* HORT., エンコウスギ 〔葉〕 kayaflavone, sciadopitysin, sotetsuflavone, A.I. (1958).

Cunninghamia konishii HAYATA, ランダイスギ 〔葉〕 kayaflavone, hinokiflavone, A.I. (1958).

Cunninghamia lanceolata HOOK, コウヨウザン 〔分析〕 h.c. 55.36, cell. 41.41, lignin 33.41, ex. 1.82 (1.80), 〔葉〕 kayaflavone, hinokiflavone, sotetsuflavone 〔葉蠟〕 neutral estolide, A.I. (1958, 1959).

Cupressus arizonica (心材) carvacrol, β-thujaplicin, nootkatin, a new C_{15}-tropolone, widdrol, β-sitosterol, lignoceric acid, a new diterpene-diacid, α-cedrene, cuparene, humulene, thujopsene, C. ENZELL, M. KROLIKOWSKA, Arkiv Kemi, **20**, 157 (1962), ABIPC, **34**, 221 (abs. no. 802).

Cupressus lindleyi (心材) hydronootkatinol, BICHO, ZAVARIN, BHACCA, J. Org. Chem., **28**, 2927 (1963).

Cupressus pygmaea (精油) pygmaen (a tropolone) (心材) α-thujaplicinol, nootkatin, a new tropolone (6-isopropyl-7-hydroxytropolone), E. ZAVARIN, et al., J. Org. Chem., **26**, 173, 1679 (1961).

Cupressus torulosa (心材) carvacrol, carvacrol methyl ether, α-thujaplicin, β-thujaplicin, β-thujaplicinol, nootkatin, ferruginol, hinokiol, hinokione, manool, torulosal (new diterpene), torulosol (new diterpene), cuparene, humulene, thujopsene, β-dolabrin, BARRETO et al., Acta. Chem. Scand., **15**, 1313 (1961).

Dalbergia latifolia (材) dalbergione, Dempsey, Donnelly, Laidlaw, Chem. Ind. **1963**, 491 ; latifolinone, dalberginone, dalatinone RAO, SESHADRI, Tetrahedron letters, no. 4, 211 (1963), (心材) latifolin, RAO et al., Tetrahedron, **18**, 1503 (1962).

Dipterocarpus grandiflorus (材) dipterocarpol A.I. (1960).

Engelhardtia formosana（樹皮）dihydrokaempferol-3-L-rhamnoside, afzelin, astilbin, quercitrin A.I. (1960).

Eucalyptus wandoo（心材）3, 5, 4′-trihydroxystilbene, D. E. HATHWAY, J. W. T. SEAKINS, Biochem. J., **72**, 369 (1959).

E. gigantea（材）ellagic acid, catechin, polymerized leucodelphinidin, leucocyanidine, A.I. (1960).

E. maculata（材）ellagic acid, p-hydroxycinnamic acid, naringenin, A.I. (1960).

E. sieberiana（材）ellagic acid, ellagitannin, juglanin, corilagin, β-glucogallin, catechin, shikimmic acid, polymerized leucodelphinidin, leucocyanidin, W. E. HILLIS, A. CARLE, Biochem. J., **74**, 607 (1960).

E. sideroxylon（葉）3, 5, 4′-trihydroxy-, 3, 5, 3′-trihydroxy-4′-methoxy-, および 3, 5, 3′ 4′ 5′-pentahydroxystilbene, W. E. HILLIS, 長谷川正男, Biochem. J., **83**, 503 (1962).

Eugenia maire（樹皮）3, 3′, 4-tri-O-methylellagic acid, β-sitosterol, mairin (new dihydroxytriterpene), BRIGGS et al., J. Chem. Soc., **1961**, 642.

Euptelea polyandra フサザクラ（葉）isoquercitrin, A.I. (1960).

Fagara ailanthoides カラスザンショウ（樹皮）skimmiamine, magnoflorine, laurifoline 刈米，木村，和漢薬用植物.

Flaxinus spp. トネリコ属（樹皮）esculetin, esculin, syringin, fraxin, fraxetin, isofraxidin, coniferin 刈米，木村，和漢薬用植物，K. (1958).

Ginkyo biloba イチョウ（材）hydroginkgolic acid (6-hydroxy-2-tetradecyl benzoic acid), FU, FENG-Yung, YU, DE-QUAN, SUNG, Wei-Liang, JAI, YUN-FENG, SUM, NAN-CHUN, ABIPC, 33, 1575 (abs. no. 8570).

Gleditschia horrida サイカチ（材）fustin, fisetin, gleditsin, 刈米，木村，和漢用植物.

Gleditschia japonica サイカチ（心材）gleditsin (=mollisacacidin) A.I. (1958).

Glyptstrobus pensilis K. KOCH, スイショウ〔葉〕quercetin, avicularin, sequoyitol, hinokiflavone, kaempferol glucoside (m.p. 250–252°)〔葉蠟〕non-estolide A.I. (1958, 1960).

Hovenia dulcis ケンポナシ（材）hovenic acid, 高橋幸太郎，田辺良久，福山忠男，薬誌，**79**, 500 (1959).

Ilex integra（葉）rutin A.I. (1960).（樹皮）α-amyrin, β-amylin, lupeol, ibrol, 伊勢田，柳下，東矢，薬誌，**74**, 422 (1954).

Illicium anisatum（樹皮）quercitrin A.I. (1958).

Juglans rigida テウチワグルミ（葉）juglanin A.I. (1958).

J. ailanthifolia オニグルミ（心材）β-sitosterol, gallic acid, ellagic acid 近藤，伊藤，須田，木材誌，**2**, 221 (1956).（木材分析）クルミ alc. benz. ex. 3.74, pent. 22.3, lignin 21.7, α-cell. 44.6.

Juniperus chinensis LINN. イブキ（ビャクシン）〔材〕thujopsene, cuparene, cedrol, widdrol, hinokiic acid, "widdringtonia acid II", carvacrol, thymohydroquinone,

3-hydroxythymoquinone, 3, 6-dihydroxythymoquinone, nootkatin, α- および β-thujaplicin, α-cedrene, 〔葉〕 kayaflavone, hinokiflavone, α-pinene, limonene, bornyl ester (formate, acetate, iso-butylate, varelate), cadinene, 単環性 sesquiterpenealcohol, undecylenic acid, stearic acid A.I. (1958), 木工ハンド, 879

Juniperns chinensis LINN. var. *procumbens* ENDL. (*Sabina procumbens* SIEB. et ZUCC.), ハイビャクシン 〔葉〕 hinokiflavone A.I. (1958).

Juniperns chinensis L. var. *Sargenti* HENRY, ミヤマハイビャクシン 〔葉〕 kayaflavone, hinokiflavone, A.I. (1958).

Juniperus conferta PARL., ハイネズ 〔葉〕 kayaflavone, A.I. (1958).

Juniperus horizontalis (材) thujopsene, α-cedrene, cuparene, cedrol, widdrol, β-sitosterol, fatty acid esters, β-sitosterol esters, savinin, communic acid, von RUDLOFF et al., Can. J. Chem., **39**, 2572 (1961).

Juniperus procera (心材) procerin (a tropolone) J. RUNEBERG, Acta Chem. Scand., **15**, 645 (1961).

Juniperus communis (材) thujopsene, cuparene, humulene, cedrol, widdrol, α, β-unsatd, aldehyde, calamenene, Δ-cadinene, isocadinene, α-, β-thujaplicin, nootkatin, savinin, BREDENBERG et al., Acta Chem. Scand., **15**, 455, 961 (1961).

Juniperus rigida SIEB. et ZUCC., ネズ 〔葉, 精油〕 α-pinene 29.8, camphene 0.5, β-pinene 0.6, Δ^3-carene 0.7, myrcene 4.8, limonene 3.9, α-terpinene 0.2, p-cymene 0.9, γ-terpinene 0.8, β-elemene 0.4, caryophyllene 1.7, humulene 1.4, δ-cadinene 0.5, γ-cadinene 1.4, calamalene 0.1, bisabolene 0.1, fenchone 0.4, camphor 0.8, methylnonylketone 0.6, cinnamic aldehyde 0.1, leaf aldehyde 0.7, hexylaldehyde 0.2, bornyl acetate 29.5, terpinyl acetate 0.5, citronellyl acetate 0.2, geranyl acetate 0.1, fenchyl acetate 2.3, bornyl caproate 0.1, borneol 1.0, citronellol 0.1, linalool 0.1, anethole 0.1%, 西村, 広瀬, 日化, **83**, 350 (1962), 果実の精油, 西村, 酒井, 広瀬, 日化, **81**, 1766 (1960).

Juniperus utahensis (心材) thujopsene, cuparene, widdrol, widdringtonia diol, carvacrol, nootkatin, hinokiic acid, β-thujaplicin, α-cedrene, J. RUNEBERG, Acta Chem. Scand., **14**, 797 (1960).

Kalopanax septemlobus センノキ (材) oleanolic acid (sapogenin) 近藤, 黒島, 手島, 住本, 木材誌, **9**, 125 (1963).

Laburnum alpinum (心材) 3, 4, 3′ 5′-tetrahydroxystilbene, genestein, genestein-5-methyl ether, H. ERDTMAN, T. NORIN, Acta Chem, Scand., **17**, 1781 (1963).

Larix decidua (材) taxifolin, aromadendrin, liovil, seco-isolariciresinol, K. FREUDENBERG, K. WEINGES, Tetrahedron letters, no. 17, 19 (1959).

Larix layllii (心材) taxifolin, aromadendrin, conidendrin, NAIR, von RUDLOFF, Can. J. Chem., **38**, 177 (1960).

Larix Gmelinii LEDEB, グイマツ 〔分析 (%)〕 全繊維素 51.57, α-繊維素 33.31, リグニン 26.13, 抽出物 3.36 (13.59) 〔葉蠟〕 non-estolide, A.I. (1958).

Larix leptolepis MURRAY, カラマツ〔分析（%）〕全繊維素 54.19, α-繊維素 38.74, リグニン 29.60, 抽出物 3.23 (6.37)〔樹脂〕dextropimaric acid (22.5%), dihydroabietic acid (6.9%), abietic acid, neoabietic acid, palustric acid〔葉蠟〕non-estolide, A.I. (1958).

Liriodendron tulipifera (心材) liliodenine $C_{17}H_9O_3N$ BUCHANAN et al., J. Org. Chem., **25**, 1389 (1960).

Maesopsis eminii (心材) musizin (2-acetyl-1, 8-dihydroxy-3-methylnaphthalene, COVELL et al., J. Chem. Soc., **1961**, 702.

Magnolia obovata ホオノキ (樹皮) magnocurarine, magnolol, machilol, 刈米, 木村, 和漢薬用植物.

Manikara bidentata (*Mimusps globosa*) (心材) n-alkanes (tridecane-tetracosane), palmitic, stearic acid, β-amyrin, bassic acid, cyclolaudenol, α-spinasterol W. COCKER, S. J. SHAW, J. Chem. Soc., **1963**, 677.

Metrosideros umbellata (心材) arjunolic acid, a condensed tannin, R. E. CORBETT, C. R. Bailey, Austral. J. Chem., **16**, 191 (1963).

Melanorrhea sp. (心材) 2-(3, 4-dihydroxy benzylidene)-4-hydroxy-6-methoxycoumarin-3-one, (±)-dihydroquercetin, F. E. KING et al., J. Chem. Soc., **1962**, 1192.

Metasequoia glyptostroboides HU et Cheng, メタセコイヤ〔分析〕〔葉〕sequoyitol, hinokiflavone, quercecitrin; α-carotene, violaxanthin, lutein, 肥田, 中田, 植物誌, **74**, 369 (1961),〔葉蠟〕non-estolide.

Michelia compressa オガタマノキ (樹皮) oxyacanthine, berberine, palmatine, jatrorrhizine, magnoflorine, A.I. (1960).

Morus acidosa (葉) n-butanol, β, γ-hexenol, n-sec-octyl alcohol, benzyl alcohol, phenyl ethyl alcohol, A.I. (1958).

Morus bombycis (?) oxyresveratrol, morin, glucose, rhamnose, xylose, mannose, 近藤民雄, 伊藤博之, 須田元茂, 農化, **32**, 1 (1958). (葉) β, γ-hexenol, α, β-hexenal, A.I. (1959).

M. lactea (心材) dihydromorin, dihydrokaempferol, A.I. (1959).

M. alba クワ (葉) isoquercitrin, 奥正己, C. (1935) II. 528.

Myrica esculenta (樹皮) β-sitosterol, taraxerol, a triterpenediol, AGARWAL, ROY, DHAR, ABIPC **34**, 75 (abs. no. 110).

Myrica rubra ヤマモモ (樹皮) tannin, myricetin, myricitrin, 刈米, 木村, 和漢薬用植物.

Nerium odorum キョウチクトウ (樹皮) odoroside A (digitoxigenin+D-digitose), odoroside B (uzarigenin+D-digitose), adynerin (adynerigenin+D-digitose), R. TSCHESCHE et al., Ber., 88, 511 (1955); S. Rangaswami et al. Helv. **32**, 939 (1949), (葉) oleandrin, W. NEUMANN Ber., **70**, 1547 (1937), 石舘守三, 田村善三, 薬誌, **70**, 7 (1950).

Ougeinia dalbergioides (心材) homoferreirin, ougenin (5, 2′, 4′-trihydroxy-7-methoxy-6-methyl isoflavanone), BALAKRISHNA et al., ABIPC, **31**, 1779 (1961).

Phellodendron amurense キハダ (樹皮) obacunone, β-sitosterol, γ-sitosterol, 7-dehydrostigmasterol, phellodendrin, A.I. (1958), candicine, A.I. (1960). berberine, palmatine, magnoflorine, guanidine, obakunone, obakulactone, dictamnolid, 刈米, 木村, 和漢薬用植物.

Phyllocladus trichomanoides (心材) sequoyitol, pinitol, myoinositol, arabinose, 1-O-methylmucoinositol, ADHIKARI et al., J. Chem. Soc., **1962**, 2829.

Picea ajanensis (樹脂) levopimaric, abietic, neoabietic, palustric, dextropimaric, dehydroabietic, dihydroabietic acid, CHERCHES et al., ABIPC, **31**, 974 (1961).

Picea Glehnii MAST. アカエゾマツ〔分析(%)〕全繊維素 51.53, リグニン 29.17, 抽出物 2.60, 〔葉〕 picein, piceol, resveratrol, resveratrol-β-D-glucoside (=3, 5, 4′-trihydroxystilbene-3-β-D-glucoside), A.I. (1959).

Picea jezoensis CARR. エゾマツ〔分析(%)〕全繊維素 56.83, α-繊維素 40.70, リグニン 28.94, 抽出物 2.52 (3.63) 〔樹脂〕 levopimaric acid, abietic acid, neoabietic acid, dextropimaric acid, dehydroabietic acid, A.I. (1960).

Picea Koyamai SHIRASAWA, ヤツガタケトウヒ 〔葉〕 resveratrol, 3, 4 dihydroxyacetophenone, 〔葉蠟〕 estolide, A.I. (1959).

Picea maximowiczii REGEL, ヒメバラモミ 〔葉〕 3, 4-dihydroxyacetophenone, A.I. (1959).

Picea polita CARR. バラモミ 〔樹皮〕 tannin material (15～17%), piceatannol, piceatannol glucoside, 〔葉〕 resveratrol, 〔葉蠟〕 estolide, A.I. (1959).

Picrasma ailanthoides ニガキ (樹皮, 材) quassin, nigakinol, nigakione 刈米, 木村, 和漢薬用植物, VALENTA et al., Tetrahedron, **18**, 1433 (1962).

Piellis elliptica ネジキ (材) lyoniside, 安江, 加藤, 薬誌, **80**, 1013 (1960).

Pinus densiflora SIEB et ZUCC アカマツ 〔分析(%)〕全繊維素 54.72, α-繊維素 38.25, リグニン 27.99, 抽出物 3.76 (2.68) 〔材〕 pinosylvin, pinosylvin monomethylether, pinobanksin, pinocembrin, L-arabinose, glucomannan[1], azelaic acid (m.p. 106°)[2], 〔樹皮〕 lignoceric acid, hydroxyphalmitic acid, lignocerylacohol, phytosterol, dihydroquercetin (=taxifolin) 〔樹脂〕 α-pinene, camphene, β-pinene, phellandrene, α-kuromatsuene, palustric acid, 〔松根油〕 α-pinene, camphene, dipentene, α-terpineol, camphor, longifolene, 〔葉〕 α-pinene, camphene, β-pinene, phellandrene, borneol, bornylacetate, caryophyllene, cadinene, sesquiterpenealcohol, juniperic acid, fructose[3], glucose, glutamic acid, serine, glycine, alanine, valine, leucine, A.I. (1957, 1958, 1960).

1) 越島：木材誌, **9**, 132 (1963).
2) 寺嶋, 榊原, 福田：木材誌**9**, 130 (1963).
3) 広本：植物誌**76**, 264 (1963).

Pinus koraiensis SIEB. et ZUCC. チョウセンマツ〔分析(%)〕全繊維素 53.56, α-繊維素 36.73, リグニン 29.31, 抽出物 6.03 (5.36) 〔材〕 pinosylvin, pinosylvin monomethyl ether, dihydropinosylvin, dihydropinosylvin monomethylether, pinocembrin,

chrysin, pinostrobin, tectochrysin, pinobanksin, cryptostrobin, pinitol, A.I. (1958).

Pinus pentaphylla MAYR. ヒメコマツ 〔材〕 pinosylvin, pinosylvin monomethyl ether, dihydropinosylvin methyl ether, pinobanksin, chrysin, strobopinin, pinocembrin, cyptostrobin, pinitol, A.I. (1958).

Pinus sylvestris (材) pinifolic acid, C. ENZEL, O. THEANDER, Acta Chem. Scand., **16**, 607 (1962).

Pinus Thunbergii PARL. クロマツ 〔分析(%)〕 全繊維素 56.62, α-繊維素 42.56, リグニン 28.29, 抽出物 2.20 (3.62) 〔材〕 pinosylvin, pinosylvin monomethyl ether, pinocembin, 〔樹脂〕 l-α-pinene, β-pinene, camphene, dipentene, borneol, levopimaric acid, dextropimaric acid, abietic acid, neoabietic acid, isodextropimaric acid, 〔松根油〕 longifolene (=kuromatsuene), longiborneol (=kuromatsuol) 〔葉〕 α-pinene, β-pinene, camphene, phellandrene, borneol, bornyl acetate, sesquiterpene, sesquiterpenealcohol, diterpene, 〔葉蠟〕 juniperic acid, hexadecane-1, 12-diol, dodecane-1, 12-diol, triacontan-1-ol, neutral estolide, A.I. (1959, 1960).

Platanus hybrida (樹皮) betulin, betulinaldehyde, betulinaldehyde acetate, sitosterol, betulinic acid, betulonic acid, platanatic acid (3β-hydroxy-20-oxo-30-norlupan-28-oic acid), a new diketo-acid $C_{29}H_{44}O_4$, R. T. APLIN, T. G. HALSALL, T. NORIN, J. Chem. Soc., **1963**, 3269.

Podocarpus macrophyllus イヌマキ (材) macrophyllic acid, podototarin, totarol, 16-carboxy-totarol, 高橋利夫, 安江保民, 今村博之, 宮崎信, 本田収, 木材誌, **10**, 217 (1964).

Podocarpus spicatus (心材) genestein, seco-isolariciresinol, quercetin, podospicatin, (+)-taxifolin, (+)-aromadendrin, kaempferol, sequoyitol, matairesinol, α-conidendrin, BRIGGS et al., Tetrahedron, **7**, 262 (1959).

Podocarpus totara (材) totarol, 16-hydroxytotarol, sugiol, podocarpic acid, methyl podocarpate, pododacric acid, β-sitosterol, R. C. CAMBIE, L. N. MANDER, Tetrahedron, **18**, 465 (1962).

Polyalthia fragrans (インド西海岸) (樹皮) polyalthic acid, GOPINATH et al., Helv. Chim. Acta, **44**, 1040 (1961).

Populus tremuloides, *P. grandidentata* (樹皮, 葉) salicin, populin, tremuloidin, salireposide, grandidentatin, benzoic acid, p-coumaric acid, vanillic acid, syringic acid, ferulic acid, p-hydroxybenzoic acid, salicylic alcohol, pyrocatechol, aliphatic hydrocarbons, n-aliphatic alcohols, acetovanillone, vanillin, syringaldedyde I.A. PEARL et al., J. Org. Chem., **27**, 2685 (1962), TAPPI, **45**, 663 (1962), Forest Products J., **13**, 122 (1963).

Populus tremuloides (心材) α-, β-amylin, butyrospermol, 24-methylenecycloartanol, lupeol, α-amyrenonol, R. A. ABRAMOVITCH, R. G. MICETICH, Can. J. Chem., **41**, 165 (1963). (木材分析) *P. alba*, *nigra*, *Maximowiczii*, alc. benz. ex. 3.08-3.85, Pent. 19.8-23.2, lignin 17.4-24.6, α-cell. 42.5-49.6.

Poupartia axillaris チャンチンモドキ (材) β-sitosterol, naringenin, kaempferol, quercetin, aromadendrin, gallic acid, taxifolin, 高橋利夫, 安江保民, 今村博之, 宮崎信, 本田収, 木材誌, **9**, 119 (1963).

Prunus avium (葉, 芽) taxifolin, aromadendrin, d-catechin (心材) 7-methyl aromadendrin, A.I. (1959).

Prunus mume ウメ (材) kaempferol glucoside, naringenin, prunin, (+)-catechin, (−)-epicatechin, leucoanthocyanidin, 長谷川正男, J. Org. Chem., **24**, 408 (1959).

P. Ssiori シウリザクラ, *P. spinulosa* リンボク (材) (+)-catechin, (−)-epicatechin, naringenin, aromadendrin glycoside, eriodictyl glycoside, taxifolin glycoside, glucoluteolin, quercetin glycoside, 長谷川正男, 林誌, **38**, 107 (1956).

Prunus yamasakura (材) isoolivil naringenin, eriodictyl, genkwanin, 長谷川正男, 白戸輝雄, 林誌, **41**, 1 (1959).

Pterocarpus erinaceus (心材) angolensin, A.I. (1959).

Pterocarpus osun (心材) homopterocarpin, acetyl oleanolic acid, santal, A.I. (1959).

Pterocarpus santalnoides (心材) arachidic acid, acetyl oleanolic acid.

Pterocarpus mildbraedii (心材) homopterocarpin, pterocarpin, angolensin, santal, acetyl oleanolic acid, AKISANYA et al., J. Chem. Soc., **1959**, 2679.

Punica granatum ザクロ (樹皮, 根皮) pelletierine, isopelletierine, methylpelletierine.

Quercus grauca アラカシ (材) D-mannitol, 南, 葉梨, 木材誌, 8, 258 (1962).

Quercus spp. カシ属 (樹皮) *Q. suber* のコルクより, phellonic acid $CH_2OH(CH_2)_{20}COOH$, phloionolic acid $CH_2OH(CH_2)_7CH(OH)CH(OH)(CH_2)_7COOH$, $HOCH_2(CH_2)_7CH=CH(CH_2)_7COOH$, phellogenic acid $HOOC(CH_2)_{20}COOH$, $HOOC(CH_2)_7CH=CH(CH_2)_7COOH$, phloinic acid $HOOC(CH_2)_7CH(OH)CH(OH)(CH_2)_7COOH$, friederin, cerin, friedelane-2, 3-dione, K. (1958), A.I. (1960).

Q. sessiliflora, pedunculata (樹皮) (+)-catechin, (+)-gallocatechin, leucodelphinidin, A.I. (1958).

Q. tinctoria (樹皮) quercitrin.

Q. suber (樹皮) friedelane-2, 3-dione A.I. (1960).

Rapanea Maximowicziana シマタイミンタチバナ (樹皮, 材) rapanone, 浅野, 山口, 薬誌, **50**, 585 (1940).

Rhus succendanea ハゼノキ (材) fisetin, fustin.

R. vernicifera ウルシ (材) fisetin, fustin.

Rhamnus crenata イソノキ (樹皮) chrysophanol, physcion, emodin, frangulin, 南享二, 善本和孝, 木材誌, **9**, 171 (1963).

Rhizophora mucuronata オオバヒルギ (樹皮) タンニン,

Robinia pseudoacacia (心材) (+)-7, 3′, 4′, 5′-tetrahydroxyflavan-3, 4-diol, (−)-robinetinidol, (+)-dihydrorobinetin, (−)-7, 3′, 4′ 5′-tetrahydroxyflavanone (robtin),

robinetin, 2′, 4′, 3, 4, 5-pentahydroxychalcone (robtein), leucorobinetinidin, polymeric leucorobinetinidin tannin, D. G. ROUX, E. PAULUS, Biochem. J., **82**, 324 (1962).

Salix spp. ヤナギ属（樹皮）salicin, picein, arbusculoside, caesioside, salireposide, isosalipurposide, salipurposide, rutin, friederin, K. (1958).

Schima Liukiuensis イジュ（材）A_1-barrigenol, R_1-barrigenol, tiglic acid, rhamnose, galactose（以上サポニンより）, mannose, glucose, galactose, 高橋，宮崎，安江，今村，本田，木材誌，**9**, 59 (1963).

Schinopsis balansae（心材）(+)-catechin, gallic acid, A.I. (1960).

Schinopsis balansae, S. quebracho-colorado（心材）(±)-fustin, ROUX et al., Biochem. J., **78**, 785 (1961).

Sequoiadendron giganteum BUCH, セコイアオスギ〔葉〕*d*-pinitol, A.I. (1959).

Sequoia sempervirens ENDL, セコイアメスギ〔葉〕kayaflavone, hinokiflavone, A.I. (1958).

Sonneratia apetala（樹皮，心材）3, 3′, 4-trimethoxy-4′-hydroxydiphenic acid dilactone, β-sitosterol, ursolic acid, SRIVASTAVA, BHAKUMI, SHARMA, KAUL, ABIPC, **33**, 1198 (1963).

Sophora japonica エンジュ（材）sophorol 刈米，木材，和漢薬用植物（花，果につきても），（木材分析）alc. benz. ex. 9.07, pent. 23.6, lignin 19.1, α-cell. 50.0.

Sorbus aucuparia（心材）aucuparin, methoxyaucuparin, H. ERDTMAN et al., Acta Chem. Scand., **15**, 1796 (1961).

Sorbus decora（材）xyloside of (+)-dimethoxyisolariciresinol, aucuparin, methoxyaucuparin, β-sitosterol fatty acid esters, leucoanthocyanidin, NARASIMHACHARI et al., Can. J. Chem., **40**, 1182 (1962).

Sorbus aucuparia（樹皮）lupeol, betulin, 23-hydroxybetulin, LAWRIE et al., J. Chem. Soc., **1960**, 4303.

Swietenia mahagoni (west indian mahogany)（材）cycloeucalenol, A.I. (1959).

Taiwania cryptomerioides HAYATA, タイワンスギ hinokiflavone, A.I. (1958).

Taxodium distichum RICH, ヌマスギ〔葉〕hinokiflavone, avicularin, quercetin, sequoyitol〔葉蠟〕non-estolide, distichin ($C_{21}H_{20}O_{11}\cdot\frac{1}{2}H_2O$, m.p. 261–263°) A.I. (1958, 1960).

Tectoma grandis（材）tectoquinone, lapachonone, coutchouc, tectol, dehydrotectol, W. SANDERMANN, H. DIETRICHS, Holzforschung, **13**, 137 (1959).

Terminalia tomentosa（心材）β-sitosterol, oleanolic acid, arjunolic acid, barrintogenol, tomentosic acid, RAMACHANDRA et al., Tetrahedron, **18**, 827 (1962).

Tetraclinis articulata（心材）arabinose, carvacrol, thymohydroquinone, p-methoxythymol, thymoquinone, cedrol, hinokiol, hinokione, totarol, phenolic diterpene ketone, totarone, diterpene hydroxy acid, totarolenone, β-, γ-thujaplicin, cedrene, CHOW, YANN-LANG, H. ERDTMAN, Acta Chem. Scand., 16, 1291 (1962).

Thuja orientalis LINN, コノテガシワ〔材〕thujic acid, β- および γ-thujaplicin,

widdrene (thujopsene), cedrol〔葉〕hinokiflavone〔葉蠟〕neutral estolide, A.I. (1958, 1959).

Thuja plicata (樹皮) catechin, epicatechin, leucocyanidin B, C, sucrose, D-glucose, D-fructose, shikimic acid, aspartic acid, p-hydroxyphenylpyruvic acid, 3, 4-dihydroxyphenylpyruvic acid, E. P. SWAIN, TAPPI, **46**, 245 (1963).

Thuja Standishii CARR. ネズコ (クロベ)〔分析〕h.c. 48.93, c. 29.95〔材〕C_{10}-tolopolone, β-sitosterol, carvacrol, α-, β-thujaplicin, 広瀬敬二,中塚友一郎, 木材誌, **10**, 253 (1964).〔葉〕hinokiflavone, A.I. (1958).

Thujopsis dolabrata SIEB. et ZUCC., アスナロ (ヒバ)〔分析〕h.c. 53.33, c. 32.59, lignin 29.24, ex. 2.38 (4.29)〔材〕carvacrol, β-dolabrin, *l*-rhodinic acid, β-tujopsene, widdrane, cuparane, cedrane, terpene, cedrol, pseudocedrol, phenol, hinokitiol, α-thujaplicin, 2-methoxy-4-isopropylphenol, hinokiic acid〔葉〕sabinene, dipentene, borneol, sabinol, bornylacetate, sabinylacetate, sesquiterpenealcohol, 2環性 sesquiterpene, 4環性 diterpene, undecylenic acid, sciadopitysin, sotetsuflavone, hinokiflavone〔葉蠟〕neutral estolide, A.I. 1957, 1958, 1959, 1960, 木工ハンド, 879

Tilia japonica シナノキ (葉) rutin, tilianin, A.I. (1960).

T. cordata (樹皮) taraxerol, K. (1958).

Trochodendron aralioides ヤマグルマ (樹皮) oleanolic acid, β-amyrin, lupeol, betulin, 小幡, 農化誌, **17**, 1102, 2220 (1941), 宍戸, 成田, 日化誌, **45**, 1187 (1942). 木材分析(%): alc. benz. ex. 5.57, lignin 20.4, pent. 21.4, α-cell. 46.8.

Tsuga diversifolia MAST. コメツガ〔分析(%)〕全繊維素 51.80, α-繊維素 40.22, リグニン 30.26, 抽出物 2.36 (アルコール), 1.94 (水),〔葉〕maltol, neutral estolide, A.I. (1959).

Xylia dolabriformis ピンガド (心材) manoyl oxide, 3-oxomanoyl oxide, sandaracopimaradienone, sandaracopimaradien-3-one, -3β-ol, -3β, 18-diol, R. A. LAIDLAW, J. W. W. MORGAN, J. Chem. Soc., **1962**, 644, ABIPC **33**, 1577 (abs. no. 8579).

Zelkowa serrata ケヤキ (材) keyakinin, keyakinol, 舟岡浩二, 田中昌伸, 木材誌 **3**, 173 (1957). (樹皮) friederin.